TRAVIS COUNTY, TEXAS

2021 Inventory of Community-Wide Greenhouse Gas Emissions

Prepared For:

Travis County, Texas

Produced By:

ICLEI – Local Governments for Sustainability USA
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ICLEI – Local Governments for Sustainability USA
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Letter from Commissioner Shea

Friends, neighbors, residents, and business owners,

I am so pleased to present Travis County's first Community-Wide Greenhouse Gas Inventory Report. As a member of ICLEI Local Governments for Sustainability, LGS, Travis County joined the Race to Zero Campaign in 2020. We are committed to reaching net-zero greenhouse gas (GHG) emissions from County operations by 2030 and for the entire Travis County community by 2050. This report is an essential tool that will inform future strategies and actions, and give us a baseline to measure progress. We are grateful to LGS and the City of Austin's Office of Sustainability for their partnership in creating this report, and to the many businesses and government agencies that provided us with data.

Travis County Commissioner
Brigid Shea

It's clear that GHG emissions are causing profound changes to our climate. They pose serious risks to the health, wellbeing, and prosperity of our community, while impacting underserved communities the most. The science is clear that the window to make a difference is rapidly closing. The science is also clear we still have the time and the tools to secure a livable future for all. Our actions now will determine the fate of future generations.

Travis County is dedicated to reducing its operational carbon footprint. We produced a GHG inventory and subsequently created a Climate Action Plan for county operations in 2020. The county has been reducing its own emissions by improving energy efficiency in our buildings, adding electric and hybrid vehicles to our fleet, and enabling more employees to work from home.

But to reach our community net zero emissions goal by 2050, we need your help. There is still time to prevent the worst effects of climate change, and we all have a role to play. Please join us in the commitment to reduce emissions, increase resilience, and conserve resources in your own homes and businesses. This report helps show the way.

Brigid Shea,
Travis County Commissioner, Precinct 2

Key Findings

Figure 1 shows community-wide emissions by sector. The largest contributor is Transportation with 41% of emissions. The next largest contributors are Residential Energy (19%), Commercial Energy (17%), and Industrial Energy (10%), and Process & Fugitive (9%). Actions to reduce emissions in all of these sectors will be a key part of a climate action plan. Solid Waste and Water & Wastewater were responsible for the remaining (less than 5%) emissions.

The Inventory Results section of this report provides a detailed profile of emissions sources within Travis County, Texas, information that is key to guiding local reduction efforts. These data will also provide a baseline against which the county will be able to compare future performance and demonstrate progress in reducing emissions.

EMISSIONS AT A GLANCE

1 **Transportation** 41%

2 **Residential Energy** 19%

3 **Commercial Energy** 17%

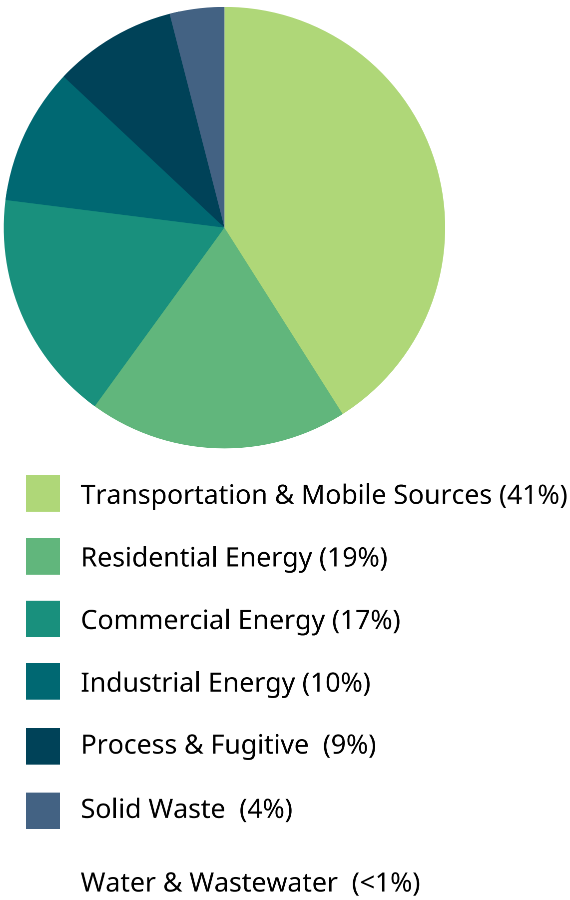


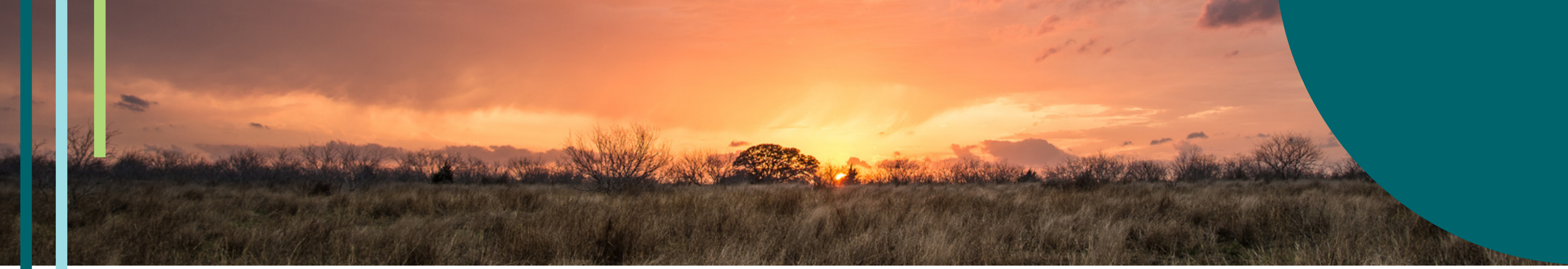
Figure 1: Community-Wide Emissions by Sector

Introduction to Climate Change

Naturally occurring gases dispersed in the atmosphere determine the Earth's climate by trapping solar radiation. This phenomenon is known as the greenhouse effect. Overwhelming evidence shows that human activities are increasing the concentration of greenhouse gases and changing the global climate. The most significant contributor is burning fossil fuels for transportation, electricity generation and other purposes, which introduces large amounts of carbon dioxide and other greenhouse gases into the atmosphere.

Collectively, these gases intensify the natural greenhouse effect, causing global average surface and lower atmospheric temperatures to rise, threatening the safety, quality of life, and economic prosperity of global communities. Although the natural greenhouse effect is needed to keep the earth warm, a human-enhanced greenhouse effect with the rapid accumulation of Greenhouse Gases (GHG) in the atmosphere leads to too much heat and radiation being trapped. The Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report confirms that human activities have unequivocally caused an increase in carbon emissions [1]. Many regions are already experiencing the consequences of global climate change, and Travis County is no exception.

[1] IPCC, 2021: Summary for Policymakers. In: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [MassonDelmotte, V., P. Zhai, A. Pirani, S. L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M. I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J. B. R. Matthews, T. K. Maycock, T. Waterfield, O. Yelekçi, R. Yu and B. Zhou (eds.)]. Cambridge University Press. In Press.



Travis County is no stranger to extreme weather. Central Texas experiences both significant flooding and droughts, heat waves and freezes, and intense storms producing tornadoes, hail, and lightning. Climate change is intensifying these patterns, leading to more frequent extreme events and more variability year to year. According to local climate projections produced in 2022-23 by the University of Texas (UT) at Austin, Travis County is expected to see an increase in both average temperatures and average rainfall. The number of 100-degree days will continue to rise and could nearly double by mid- to late-century compared to recent decades. On the other end of the spectrum, intense winter storms like Uri (2021) and Mara (2023) are also expected to be more common than in the past.

The UT study predicts that rainfall will increase 10-30% between now and 2040. Rather than being spread throughout the year, however, concentrated periods of rainfall will be separated by periods of drought. Travis County is also expected to become windier, with calm days (with wind speed less than 5 miles per hour) dropping from an average of 110 per year historically to about 20 per year in the future. This, together with the periods of drought and extreme heat, contributes to a higher risk of wildfire in the region.

[2] Austin Future Climate: Climate Change Predictions for the City of Austin 2023. Niyogi, Dev and Singh, Mangmeet. February 2023.

According to the 2018 National Climate Assessment, the increasing temperature and extreme precipitation in our region will impact social and economic systems, particularly as infrastructure ages and populations shift to urban centers [3]. Rapid urbanization increases demand on the food, water, and energy sectors, which are also being stressed by extreme temperatures and weather events. These essential systems are interdependent, so all are effected when one is impacted, leading to cascading issues.

Fortunately, Travis County and many other communities around the world have started to address climate change at the local level, both by reducing greenhouse gas emissions and by taking actions to mitigate the effects that are already being seen. Many of these climate actions have multiple public benefits. For example, planting trees and weatherizing homes not only reduces greenhouse gases, but also helps the community deal with extreme heat. Retrofitting homes and businesses to be more efficient creates local jobs. More efficient use of energy decreases utility and transportation costs for residents and businesses. Increasing opportunities for walking and bicycling improves residents' health, and reducing fossil fuel use improves air quality. Taking climate action now not only reduces future climate hazards, but can also improve the economy, public health, and quality of life.

[3] U.S. Global Change Research Program. 2018. National Climate Assessment – Ch 23: Southern Great Plains. Retrieved from https://nca2018.globalchange.gov/chapter/23.

Greenhouse Gas Inventory as a Step Toward Carbon Neutrality

Facing the climate crisis requires the concerted efforts of local governments and their partners, those that are close to the communities directly dealing with the impacts of climate change.

Cities, towns and counties are well placed to define coherent and inclusive plans that address integrated climate action — climate change adaptation, resilience and mitigation. Existing targets and plans need to be reviewed to bring in the necessary level of ambition and outline how to achieve net-zero emissions by 2050 at the latest. Creating a roadmap for climate neutrality requires Travis County, Texas to identify priority sectors for action, while considering climate justice, inclusiveness, local job creation and other benefits of sustainable development.

To complete this inventory, Travis County utilized tools and guidelines from ICLEI - Local Governments for Sustainability (ICLEI), which provides authoritative direction for greenhouse gas emissions accounting and defines climate neutrality as follows:

> The targeted reduction of greenhouse gas (GHG) emissions and GHG avoidance in government operations and across the community in all sectors to an absolute net-zero emission level at the latest by 2050. In parallel to this, it is critical to adapt to climate change and enhance climate resilience across all sectors, in all systems and processes.

To achieve ambitious emissions reduction, and move toward climate neutrality, Travis County will need to set a clear goal and act rapidly following a holistic and integrated approach. Climate action is an opportunity for our community to experience a wide range of co-benefits, such as creating socio-economic opportunities, reducing poverty and inequality, and improving the health of people and nature.

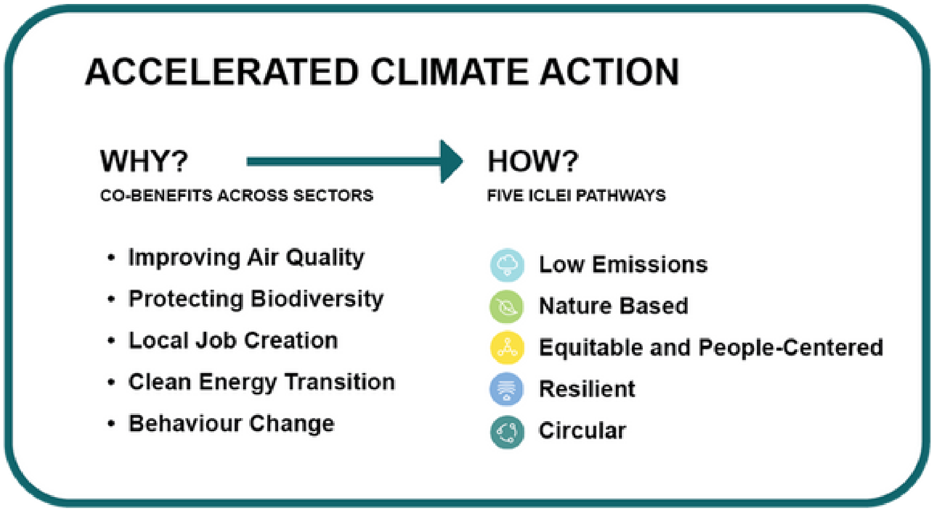


Figure 2: Co-Benefits and ICLEI Pathways to Accelerated Climate Action

ICLEI Climate Mitigation Milestones

In response to the climate emergency, many communities in the United States are taking responsibility for addressing emissions at the local level. Since many of the major sources of greenhouse gas emissions are directly or indirectly controlled through local policies, local governments have a strong role to play in reducing greenhouse gas emissions within their boundaries, as well as influencing regional emissions through partnerships and advocacy. Through proactive measures around land use patterns, transportation demand management, energy efficiency, green building, waste diversion, and more, local governments can dramatically reduce emissions in their communities. In addition, local governments are primarily responsible for the provision of emergency services and the mitigation of natural disaster impacts.

ICLEI provides a framework and methodology for local governments to identify and reduce greenhouse gas emissions, organized along with Five Milestones, also shown in Figure 2:

1. Conduct an inventory and forecast of local greenhouse gas emissions;
2. Establish a greenhouse gas emissions Science-Based Target [4];
3. Develop a climate action plan for achieving the emissions reduction target;
4. Implement the climate action plan; and,
5. Monitor and report on progress.

This report represents the completion of ICLEI's Climate Mitigation Milestone One and Two, and provides a foundation for future work to reduce greenhouse gas emissions in Travis County, Texas.

Figure 3: ICLEI Climate Mitigation Milestones

[4] Science-Based Targets are calculated climate goals, in line with the latest climate science, that represent your community's fair share of the ambition necessary to meet the Paris Agreement commitment of keeping warming below 1.5°C. To achieve this goal, the Intergovernmental Panel on Climate Change (IPCC) states that we must reduce global emissions by 50% by 2030 and achieve climate neutrality by 2050. Equitably reducing global emissions by 50% requires that high-emitting, wealthy nations reduce their emissions by more than 50%.

Inventory Methodology

Understanding a Greenhouse Gas Emissions Inventory

The first step toward achieving tangible greenhouse gas (GHG) emission reductions requires identifying baseline emissions levels and sources and activities generating emissions in the community. This report presents emissions from the Travis County, Texas community as a whole.

As local governments continue to join the climate protection movement, the need for a standardized approach to quantify GHG emissions has proven essential. This inventory uses the approach and methods provided by the U.S. Community Protocol for Accounting and Reporting Greenhouse Gas Emissions (Community Protocol) and the Local Government Operations Protocol for Accounting and Reporting Greenhouse Gas Emissions (LGO Protocol), both of which are described below.

Three greenhouse gases are included in this inventory: carbon dioxide (CO2), methane (CH4) and nitrous oxide (N2O). Many of the charts in this report represent emissions in “carbon dioxide equivalent” (CO2e) values, calculated using the Global Warming Potentials (GWP) for methane and nitrous oxide from the IPCC 5th Assessment Report. Other gases, such as nitrous oxide and fluorinated gases (HFCs, PFC, etc.) were included as process emissions from electronics manufacturing, but they were only collected as CO2e measurements.

Table 1: Global Warming Potential Values (IPCC, 2014)

Greenhouse Gas	Global Warming Potential
Carbon Dioxide (CO2)	1
Methane (CH4)	28
Nitrous Oxide (N2O)	265

[5] AR5 Synthesis Report: Climate Change 2014. IPCC. Retrieved from https://www.ipcc.ch/report/ar5/syr

Community Emissions Protocol

Version 1.2 of the U.S. Community Protocol for Accounting and Reporting GHG Emissions [6] was released by ICLEI in 2019, and represents a national standard in guidance to help U.S. local governments develop effective community GHG emissions inventories. It establishes reporting requirements for all community GHG emissions inventories, provides detailed accounting guidance for quantifying GHG emissions associated with a range of emission sources and community activities, and provides a number of optional reporting frameworks to help local governments customize their community GHG emissions inventory reports based on their local goals and capacities.

The community inventory in this report includes emissions from the five Basic Emissions Generating Activities required by the Community Protocol. These activities are:

- Use of electricity by the community
- Use of fuel in residential and commercial stationary combustion equipment
- On-road passenger and freight motor vehicle travel
- Use of energy in potable water and wastewater treatment and distribution
- Decomposition of of solid waste generated by the community

The community inventory also includes the following activities:

- Wastewater treatment processes
- Off-road, air, and rail passenger and freight motor vehicle travel
- Processing at industrial facilities

Quantifying Greenhouse Gas Emissions

Sources and Activities

Communities contribute to greenhouse gas emissions in many ways. Two central categorizations of emissions are used in the community inventory: 1) GHG emissions that are produced by “sources” located within the community boundary, and 2) GHG emissions produced as a consequence of community “activities.”

Table 2: Source vs. Activity for Greenhouse Gas Emissions (GHG)

Source	Activity
Any physical process inside the jurisdictional boundary that releases GHG emissions into the atmosphere.	The use of energy, materials, and/or services by members of the community that result in the creation of GHG emissions.

[6] ICLEI. 2012. US Community Protocol for Accounting and Reporting Greenhouse Gas Emissions. Retrieved from http://www.icleiusa.org/tools/ghg-protocol/community-protocol

By reporting on both GHG emission sources and activities, local governments can develop and promote a deeper understanding of GHG emissions associated with their communities. A purely source-based emissions inventory could be summed to estimate total emissions released within the community's jurisdictional boundary. In contrast, a purely activity-based emissions inventory could provide perspective on the efficiency of the community, even when the associated emissions occur outside the jurisdictional boundary. The division of emissions into sources and activities replaces the scopes framework, which is used in government operations inventories, but does not have a clear application to community inventories.

Base Year

The inventory process requires the selection of a base year with which to compare current emissions. Travis County's community GHG emissions inventory utilizes 2019 as its baseline year because it is the most recent year for which the necessary data are available.

Quantification Methods

GHG emissions can be quantified in two ways:

- Measurement-based methodologies refer to the direct measurement of GHG emissions (from a monitoring system) emitted from a flue of a power plant, wastewater treatment plant, landfill, or industrial facility.
- Calculation-based methodologies calculate emissions using activity data and emission factors. To calculate emissions accordingly, the basic equation below is used:

Activity Data x Emission Factor = Emissions

Most emissions sources in this inventory are quantified using calculation-based methodologies. Activity data refer to the relevant measurement of energy use or other GHG-generating processes such as fuel consumption by fuel type, metered annual electricity consumption, and annual vehicle miles traveled. Please see the appendices for a detailed listing of the activity data used in composing this inventory.

Known emission factors are used to convert energy usage or other activity data into associated quantities of emissions. Emissions factors are usually expressed in terms of emissions per unit of activity data (e.g. lbs CO_2/kWh of electricity). For this inventory, calculations were made using ICLEI's ClearPath Climate Planner tool.

Community Emissions Inventory Results

The total community-wide emissions for the 2021 inventory are shown in Table 3 and Figure 5. For a comparison of 2019 and 2021 emissions, see Table 4.

Table 3: Community-Wide Emissions Inventory

Sector	Fuel or Source	2021 Usage	Usage Unit	2021 Emissions (Mt CO2e)
Residential Energy	Electricity	5,907,649,075	kWh	1,738,005
	Natural Gas	105,117,436	Therms	559083
Residential Energy Total				**2,297,088**
Commercial Energy	Electricity	5,100,449,231	kWh	1,442,354
	Natural Gas	120,720,680	Therms	642,071
Commercial Energy Total				**2,084,425**
Industrial Energy	Electricity	4,176,236,250	kWh	1,173,204
	Natural Gas	1,438,561	Therms	7,635
	Alternate fuels			5,096
Industrial Energy Total				**1,185,935**
Transportation & Mobile Sources	On-Road Gasoline	8,096,409,449	VMT	3,336,582
	On-Road Diesel	863,760,371	VMT	1,258,856
	Off-Road			179,055
	Public Transit and Rail			73,842
	Aviation			173,927
Transportation & Mobile Sources Total				**5,022,262**
Solid Waste	Waste Sent to Landfill	1,114,563	Tons	442,633
	Composting			71,434
	Landfill Flaring and Combustion			6,804
Solid Waste Total				**520,871**

*Blank cells are a result of variability in the format of available data by sector and fuel or source type.

Table 3: Community-Wide Emissions Inventory (continued)

Sector	Fuel or Source	2021 Usage	Usage Unit	2021 Emissions (Mt CO2e)
Water & Wastewater	Process N2O Emissions			14,379
	Septic Systems			8,868
Water & Wastewater Total				**23,247**
Process & Fugitive Emissions	Electronics Manufacturing			904,934
	Lime Production			151,503
	Fugitive emissions from natural gas distribution			39,431
Process & Fugitive Emissions Total				**1,095,868**
Total Gross Emissions				**12,229,696**
LEARN Tool (see p. 18 for more info)				-750,482
LEARN Total				**-750,482**
Total Emissions with Sequestration				**11,479,214**

*Blank cells are a result of variability in the format of available data by sector and fuel or source type.

Figure 5 shows the distribution of community-wide emissions by sector. Transportation is the largest contributor, followed by Residential & Commercial Energy.

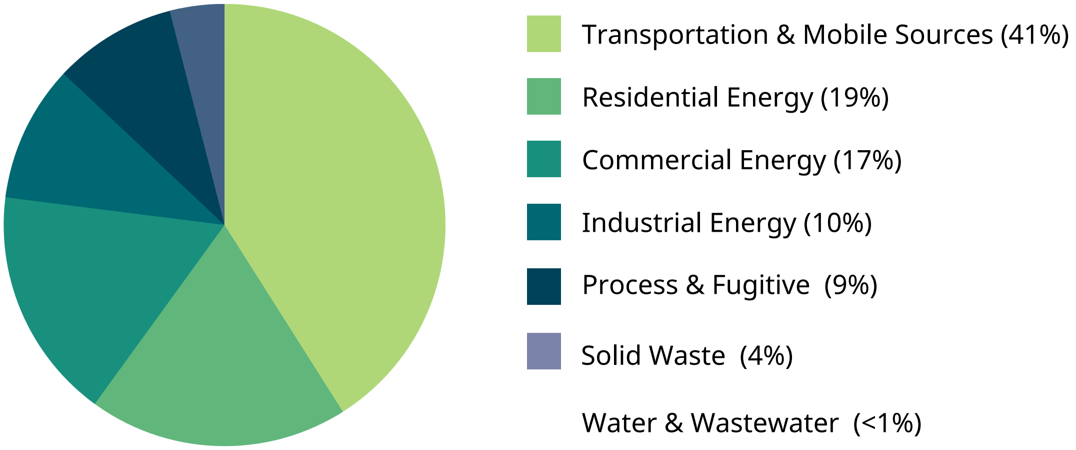


Figure 5: Community-Wide Emissions by Sector

Table 4: 2019 and 2021 Primary Community-Wide Emissions Comparison

Sector	Fuel or Source	2019 Usage	2021 Usage	2019 Emissions	2021 Emissions	Percent Change
Residential Energy	Electricity	6,061,262,250	5,907,649,075	1,940,767	1,738,005	-10.45%
	Natural Gas	109,884,095	105,117,436	584,435	559,083	-4.34%
Residential Energy Total				**2,525,202**	**2,297,088**	**-9.03%**
Commercial Energy	Electricity	5,299,077,891	5,100,449,231	2,416,581	1,442,354	-40.31%
	Natural Gas	156,126,992	120,720,680	830,385	642,071	-22.68%
Commercial Energy Total				**3,246,966**	**2,084,425**	**-35.80%**
Industrial Energy	Electricity	4,269,906,598	4,176,236,250	1,956,959	1,173,204	-40.05%
	Natural Gas	312,907	1,438,561	1,661	7,635	359.66%
	Alternate fuels			36,420	5,096	-86.01%
Industrial Energy Total				**1,995,040**	**1,185,935**	**-40.56%**
Transportation & Mobile Sources	On-Road Gasoline	9,247,424,662	8,096,409,449	3,858,357	3,336,582	-13.52%
	On-Road Diesel	986,555,708	863,760,371	1,456,271	1,258,856	-13.56%
	Off-Road			173,406	179,055	3.26%
	Public Transit and Rail			148,863	73,842	-50.40%
	Aviation			197,124	173,927	-11.77%
Transportation & Mobile Sources Total				**5,834,021**	**5,022,262**	**-13.91%**
Solid Waste	Waste Sent to Landfill	1,372,634	1,114,563	545,122	442,633	-18.80%
	Composting			66,608	71,434	7.24%
	Landfill Flaring and Combustion			7,073	6,804	-3.80%
Solid Waste Total				**618,803**	**520,871**	**-15.83%**

*Blank cells are a result of variability in the format of available data by sector and fuel or source type.
** Industrial natural gas growth is due to a customer switching from the commercial to the industrial sector.

Table 4: 2019 and 2021 Primary Community-Wide Emissions Comparison (continued)

Sector	Fuel or Source	2019 Usage	2021 Usage	2019 Emissions	2021 Emissions	Percent Change
Water & Wastewater	Process N2O Emissions			11,535	14,379	24.66%
	Septic Systems			8,648	8,868	2.54%
Water & Wastewater Total				**20,183**	**23,247**	**15.18%**
Process and Fugitive	Electronics Manufacturing			905,400	904,934	-0.05%
	Lime Production			160,506	151,503	-5.61%
	Fugitive emissions from natural gas distribution			46,206	39,431	-14.66%
Process and Fugitive Total				**1,112,112**	**1,095,868**	**-1.46%**
Total Gross Emissions				**15,352,327**	**12,229,696**	**-20.34%**

*Blank cells are a result of variability in the format of available data by sector and fuel or source type.
** Industrial natural gas growth is due to a customer switching from the commercial to the industrial sector.

Comparison Discussion

The above table compares 2019 and 2021 activity data and emissions (MT CO_2e). As shown in Table 4, Travis County's total gross emissions decreased by 20% from 2019 to 2021. This is well ahead of not only other Texas counties, but most of the United States! However, it is likely that some of this reduction is due to the effects of the COVID-19 pandemic and its impact on the way people travelled throughout the county, as well as other economic impacts of the pandemic. As the impacts of the pandemic are still being felt, it is impossible to analyze the exact extent to which emissions reductions were impacted. Some changes, however, cannot be attributed to the pandemic. Electricity use across residential, commercial, and industrial sectors combined accounted for 65% of all emissions reductions. While some of this was due to a reduction in electricity use (and possibly pandemic-related), the larger factor was Austin Energy's reduction in it grid emissions factor from 670 to 613 lbs co2/mwh. Austin Energy has been steadily transitioning to using renewable energy. In 2019, 63% of their energy generation was carbon-free, increasing to 72% in 2021.

Tree Canopy Analysis

The manner in which GHG inventories are estimated for different types of land use is more complicated than for other sectors. In addition to both emitting and removing GHGs, there are multiple carbon pools that respond differently to management activities and natural disturbances, interannual variability is high, and measurements may not be as precise as it is in other sectors (see the USCP, Appendix J). Beginning in 2019, a number of updates to protocols and guidance on estimating carbon from the Agriculture, Forestry, and Other Land Use (AFOLU) sector required that communities include the "net flux" of carbon emissions and removals - carbon emitted to the atmosphere from the land and carbon removed from the atmosphere to the land.

In coordination with ICLEI USA, Travis County was able to use the US Community Protocol's Land Emissions And Removals Navigator (LEARN) tool to calculate the net flux of AFOLU emissions from 2013-2019 [7]. This analysis reported six "land use" categories which were defined by data on land cover—forest land, grassland, cropland, wetland, settlement and other land (barren). In 2019, Travis County's total land base was approximately 654,764 acres (1,023 square miles), with nearly 32.3% Settlement (i.e. developed areas of varying intensity), around 29.5% forest, 26.5% Grassland (which includes hay/pasture, shrub/scrub and other herbaceous cover), 7.7% cropland, 3.4% wetland and 0.5% other land. 2019 is the most recent year available of the National Land Cover Dataset. Over the period 2013 to 2019, the Net GHG balance of forests and trees was -750,482 Mt CO_2e per year. Total GHG emissions for Travis County across all sectors could be reduced if additional forests/trees were added to its land base, and/or if losses of trees were reduced further. These measurements are only for trees, so carbon sequestration from other vegetation, such as grassland, likely mean that what is measured by the LEARN tool is actually an underestimate of total sequestration for the county.

While GHG Inventories are recommended every 2-3 years, AFOLU data is meant to measure change over the course of six years. Therefore, this analysis could not be used to measure differences between 2019 and 2021. Travis County can expect its next AFOLU analysis to cover changes from 2019-2025.

[7] US Community Protocol's Land Emissions And Removals Navigator (LEARN) tool. Available at https://icleiusa.org/LEARN/

Next Steps

The inventory should be used to focus and prioritize actions to reduce emissions. Based on the inventory results, the following areas have the greatest potential for emissions reduction:

- On-road transportation
    - Vehicle electrification- Transition from internal combustion engine vehicles (passenger, transit fleets, municipal fleets, etc.) to electric-powered
    - Land use/infrastructure planning- Improving infrastructure to incentivize public transit usage, walking, and biking
    - Work with communities to expand public transportation options
- Community electricity use
    - Increase distributed solar
    - Coordinate with local electric utilities to aid in decarbonization planning
- Community stationary fuels use
    - Convert gas-powered appliances (e.g., water heaters, stoves, clothes dryers) to electric powered
- Solid Waste
    - Improve recycling and composting programs to reduce organic waste content in waste streams

Completion of another GHG inventory in two to five years is recommended to assess progress resulting from any actions implemented. The detailed methodology section of this report, as well as notes and attached data files in the ClearPath Climate Planner tool and a master data Excel file provided to Travis County, will be helpful to complete a future inventory consistent with this one.

Conclusion

This inventory marks the completion of Milestones One and Two of the Five ICLEI Climate Mitigation Milestones. The next steps are to forecast emissions, set an emissions-reduction target, and build upon the existing Austin Climate Equity Plan [8] with a more regional climate action plan that identifies specific quantified strategies that can cumulatively meet that target.

The Intergovernmental Panel on Climate Change (IPCC) states that to meet the Paris Agreement commitment of keeping warming below 1.5°C we must reduce global emissions by 50% by 2030 and reach climate neutrality by 2050. Equitably reducing global emissions by 50% requires that high-emitting, wealthy nations reduce their emissions by more than 50%. More than ever, it is imperative that countries, regions, and local governments set targets that are ambitious enough to slash carbon emissions between now and mid-century.

Science-Based Targets are calculated climate goals, in line with the latest climate science, that represent a community's fair share of the global ambition necessary to meet the Paris Agreement commitment. Community education, involvement, and partnerships will be instrumental to achieve a science-based target. To meet and exceed our science-based target, Travis County, Texas has officially committed to achieving net zero greenhouse gas emissions by 2030 through ICLEI's Race to Zero.

To support the bold climate action of Travis County, Texas, ICLEI has calculated the county's Science-Based Targets [9]:

- **Per-Capita SBT: 62.9%**
- **Absolute SBT: 61.0%**

Science-Based Targets are climate goals in line with the latest climate science. They represent the county's fair share of the ambition necessary to meet the Paris Agreement commitment to keep warming below 1.5°C.

In addition, Travis County will continue to track key energy use and emissions indicators on an on-going basis. It is recommended that communities update their inventories on a regular basis, especially as plans are implemented to ensure measurement and verification of impacts. Regular inventories also allow for "rolling averages" to provide insight into sustained changes and can help reduce the chance of an anomalous year being incorrectly interpreted. This inventory shows that community-wide transportation as well as the electricity across all sectors will be particularly important to focus on. Through these efforts and others, Travis County can achieve environmental, economic, and social benefits beyond reducing emissions.

[8] Austin Climate Equity Plan. City of Austin, September 2021. https://www.austintexas.gov/page/austin-climate-equity-plan
[9] "Science Based Climate Targets: A Guide for Cities." Science Based Targets Network, November 4, 2021. https://sciencebasedtargetsnetwork.org/.
[10] Usa, Iclei. "Race to Zero." ICLEI USA, April 7, 2021. https://icleiusa.org/race-to-zero/.

Appendix: Methodology Details

Energy

Table 5: Energy Data Sources

Activity	Data Source	Data Gaps/Assumptions
Residential Electricity	Austin Energy, Bluebonnet, Pedernales	Cedar Park removed from Austin Energy dataset using population to account for differences between Travis County jurisdiction and Austin Energy service area
Commercial Electricity	Austin Energy, Bluebonnet, Pedernales	N/A
Industrial Electricity	Austin Energy, Bluebonnet, Pedernales, EPA FLIGHT	N/A
Residential Natural Gas	Texas Gas, Atmos	N/A
Commercial Natural Gas	Texas Gas, Atmos	N/A
Industrial Natural Gas	Texas Gas, Atmos	N/A
Industrial Alternative Fuels	EPA FLIGHT	N/A

Table 6: Emissions Factors for Electricity Consumption

Emissions Factor/ Year	CO2 (lbs./MWh)	CH4 (lbs./GWh)	N2O (lbs./GWh)	Data Gaps and Assumptions
Austin Energy 2019	670.89	0	0	N/A
Austin Energy 2021	613.23	0	0	N/A
ERCOT (eGRID) 2019	670.89	57	8	N/A
ERCOT (eGRID) 2021	813.6	54	8	N/A

Transportation

Table 7: Transportation Data Sources

Activity	Data Source	Data Gaps/Assumptions
On-Road Transportation	Google EIE	N/A
Airport	Austin Airport, STAR Flight, Austin PD Flight	N/A
Public Transportation	Google EIE	N/A
Railway Transportation	CapMetro	No data for local Amtrak line, but estimated to be negligible (<1% of transportation emissions)

For vehicle transportation, it is necessary to apply average miles per gallon and emissions factors for CH4 and N2O to each vehicle type. The factors used are shown in Table 8.

Table 8: MPG and Emissions Factors by Vehicle Type

Fuel	Vehicle Type	MPG	CH4 (g/mile)	N2O (g/mile)
Gasoline	Passenger car	24.1	0.0183	0.0083
Gasoline	Light truck	17.6	0.0193	0.0148
Gasoline	Heavy truck	5.4	0.0785	0.0633
Gasoline	Motorcycle	24.1	0.0183	0.0083
Diesel	Passenger car	24.1	0.0005	0.001
Diesel	Light truck	17.6	0.001	0.0015
Diesel	Heavy truck	6.4	0.0051	0.0048
Diesel	Transit Bus	3.7	0.001	0.0015

Wastewater

Table 9: Wastewater Data Sources

Activity	Data Source	Data Gaps/Assumptions
Septic Tanks	Travis County, US Census	N/A
N2O from Wastewater	City of Austin, Travis County	N/A

Solid Waste

Table 10: Solid Waste Data Sources

Activity	Data Source	Data Gaps/Assumptions
Total Waste	Texas Commission on Environmental Quality	N/A
Landfill Flaring and Gas Combustion	EPA FLIGHT	N/A
Composting	Austin Resource Recovery, J-V Dirt & Loam, Texas Organic Recovery	N/A

Process & Fugitive Emissions

Table 11: Fugitive Emissions Data Sources

Activity	Data Source	Data Gaps/Assumptions
Natural Gas Distribution	Austin Energy, Bluebonnet, Pedernales	N/A
Industrial Processes	EPA FLIGHT	N/A

Inventory Calculations

The 2019 and 2021 inventories were calculated following the US Community Protocol and ICLEI's ClearPath Climate Planner Climate Planner software. As discussed in Inventory Methodology, the IPCC 5th Assessment was used for global warming potential (GWP) values to convert methane and nitrous oxide to CO2 equivalent units. ClearPath Climate Planner's inventory calculators allow for input of the sector activity (i.e. kWh or VMT) and emission factor to calculate the final carbon dioxide equivalent (CO2e) emissions.